Course descriptions

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COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KDMFI/1-UMA-141/22	Algebra and Theoretical Arithmetic (0)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: Homework
Final assessment: Exam
Indicative assessment scale: A 94%, B 86%, C 79%, D 70%, E 60%, Fx < 60%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Acquire practical skills to solve tasks involving generalization, mathematize a verbal task, and work with general expressions. The ability to solve tasks from the theory of numbers and different types of equations, inequalities and their systems. Familiarize yourself with complex numbers.

Class syllabus:
Numbers, variables and expressions. Elementary number theory. Equations, inequalities and their systems. Complex numbers.

Recommended literature:
textbooks of Mathematics of lower and upper secondary school
Seminár z matematiky : 1. časť / Zbyněk Kubáček, Ján Žabka Bratislava : Mapa Slovakia Plus s.r.o., 2017
Seminár z matematiky : 2. časť / Zbyněk Kubáček, Ján Žabka Bratislava : Mapa Slovakia Plus s.r.o., 2018
Seminár z matematiky : 3. časť / Zbyněk Kubáček, Ján Žabka Bratislava : Mapa Slovakia Plus s.r.o., 2020

Languages necessary to complete the course:
Slovak, English

Notes:
The course is primarily intended for teacher training students; students of other programs can enroll in it only with the consent of their guarantor.

Past grade distribution
Total number of evaluated students: 85

A	B	C	D	E	FX
47,06	17,65	12,94	5,88	4,71	11,76

Lecturers: Mgr. Emília Miťková, PhD.

Last change: 17.03.2022

Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KAG/1-UMA-112/22	Algebra and Theoretical Arithmetic (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 2.

Educational level: I.

Prerequisites:

Course requirements:
Preliminary assessment: homework, test.
Final assessment: Exam in written and oral form
Final assessment examination (A 90%, B 80%, C 70%, D 60%, E 50%, Fx < 50 %)
Scale of assessment (preliminary/final): Weight of the course work / exam: 40/60

Learning outcomes:
Students will become familiar with the basic notions and methods of linear algebra.

Class syllabus:
1. Systems of linear equations 2. Vector spaces 3. Linear subspaces 4. Standard inner product 5. Linear maps and their matrix representations 6. Matrix algebra 7. Regular matrices and determinant

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 273

A	B	C	D	E	FX
21,98	20,51	18,32	17,58	17,22	4,4

Lecturers: prof. RNDr. Pavol Zlatoš, PhD., Mgr. Tomáš Rusin, PhD.

Last change: 13.02.2023

Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KAG/1-UMA-116/22	Algebra and Theoretical Arithmetic (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 5.

Educational level: I., N

Prerequisites:

Course requirements:
Preliminary assessment: two written tests (30%)
Final assessment: oral exam (70%)
During the semester, students must obtain at least 4/10 from the preliminary assessment in order to be eligible for the oral exam. Failure to meet this requirement automatically results in an FX grade.

Learning outcomes:
Students master the basics of divisibility theory in the field of integers and its applications and will be able to actively use this knowledge to solve various problems. Furthermore, they will control the expression of real numbers using g-adic developments and selected criteria for the rationality (irrationality) of real numbers.

Class syllabus:
Divisibility of integers, greatest common divisor, Euclidean algorithm, least common multiple. Prime numbers, decomposition into the product of prime numbers. Congruences, Euler's theorem and its applications, Lagrange's theorem. Number systems and divisibility criteria. Selected arithmetic functions. Rational and irrational numbers. G-adic development of real numbers. Criteria of rationality of real numbers.

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 228

A	B	C	D	E	FX
35,96	23,68	21,93	10,96	3,07	4,39

Lecturers: prof. RNDr. Pavol Zlatoš, PhD., RNDr. Jana Chalmovianská, PhD., Mgr. Tomáš Rusin, PhD.

Last change: 03.10.2025
Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KAG/1-UMA-207/22	Algebra and Theoretical Arithmetic (3)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 6.

Educational level: I.

Prerequisites:

Course requirements:
Continuous evaluation: written exam (50 p.)
Final exam: oral (50 p.)
Grades: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Knowledge and use of basic notions, characteristics and methods of ring of polynomials and divisibility in ring of polynomilas over field for solving tasks related to algebraic equations, for example for examining characteristics of polynomial roots. Gaining corresponding relevant computation skills and using specific methods for finging roots of polynomial.

Class syllabus:
Rings, integral domains and fields, subrings and homomorphisms of rings, ring of polynomials over an integral domain, roots of polynomials, divisibility, Remainder theorem, Horner scheme, Euclidean division algorithm for computing the greatest common divisor of polynomials. Fundamental theorem of Algebra, polynomials over Q, R and C. Derivate of of a polynomial, multiple roots, Taylor expansion of a polynomial.

Recommended literature:
Algebra a teoretická aritmetika 1: Tibor Katriňák a kolektív. Bratislava: Univerzita Komenského 2002
Prehľad modernej algebry: Garrette Birkhoff, Saunders Mac Lane. Preložil Štefan Znám, Jaroslav Smítal . Bratislava: Alfa, 1979
Lecture notes published on the web site of the course.

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution Total number of evaluated students: 146					
A	B	C	D	E	FX
60,96	19,18	9,59	7,53	2,05	0,68
Lecturers: doc. RNDr. Pavel Chalmovianský, PhD., RNDr. Jana Chalmovianská, PhD.					
Last change: 19.06.2022					
Approved by: prof. Mgr. Michal Chabada, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KAG/1-UMA-124/22	Combinatorics

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 1.

Educational level: I., N

Prerequisites:

Course requirements:
Continuous evaluation: homework
Final examination: written exam
Grades: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Gaining comprehensive overview of basic combinatorial problems and skills to solve them.

Class syllabus:
Basic combinatorial tools, permutations, combinations, binomila coeficients and Pascal triangle, binomial an multinomial theorem, combinatorial identities, principle of inclusion and exlusion, Dirichlet principle.

Recommended literature:
Kapitoly z diskrétní matematiky: Jiří Matoušek, Jaroslav Nešetřil. Praha: Karolinum, 2009
Kombinatorika a teória grafov: Martin Knor. Bratislava: Vydavateľstvo UK, 2000
Lecture notes.

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 340

A	B	C	D	E	FX
32,65	15,0	15,29	16,47	16,18	4,41

Lecturers: doc. RNDr. Martin Mačaj, PhD., doc. PaedDr. Peter Vankúš, PhD., Mgr. Martin Niepel, PhD., Mgr. Tomáš Rusin, PhD., Mgr. Štefánia Glevitzká, RNDr. Martina Bátorová, PhD.

Last change: 12.03.2022

Approved by: prof. Mgr. Michal Chabada, PhD.

STATE EXAM DESCRIPTION

Academic year: 2026/2027	
University: Comenius University Bratislava	
Faculty: Faculty of Arts	
Course ID: FMFI.KDMFI/1-UMA-951/22	**Course title:** Fundamentals of Mathematics
Number of credits: 2	
Educational level: I.	

Course requirements:

The course 1-UMA-951/15 Fundamentals of Mathematics has two parts:
A) School mathematics test
The test uses the types of tasks from mathematics tests for the external part of the Matura exam and from mathematics tests at the entrance exams at FMFI UK, a total of 20 short-answer tasks or with a choice of several options.
B) Oral exam
The student draws an assignment, which has 3 parts - three different circuits
1. geometry, 2. combinatorics, probability and statistics, 3. algebra and theoretical arithmetic, 4. mathematical analysis.
Each part contains
- the task from the relevant area, the solution of which (including the justification of individual steps) the student will demonstrate during the oral answer,
- definition of the area of the relevant heading, which is related to the solved task; in the oral answer the student will state the basic concepts and statements of this area, or their relationship to the problem.
Maximum points:
• 20 points from the school mathematics test (1 point for each correct answer),
• 25 points for each of the three parts of the assignment (10 for solving the problem, 15 for the theoretical part),
thus a maximum of 20 + 3.25 = 95 points in total.
A student completes the course if he/she obtains at least 5 points for each of the three parts of the assignment and a total of at least 46 points.
Scale of assessment (preliminary/final): 0/100

Learning outcomes:

State exam from selected areas of the core subjects of the program.

State exam syllabus:

Geometry
1. Study of affine space by analytical method
(subspaces - linear varieties, their parametric and general equations, intersections and mutual positions)
2. Study of Euclidean space by analytical method
(scalar product of vectors and metrics, perpendicularity of subspaces, distances of subspaces, angles)
3. Affine representations of spaces
(analytical expression of affine mapping, invariants of affine transformations, group of similarities of Euclidean space)

4. Axiomatic construction of geometry: incidental and ordered plane
(axioms of incidence and arrangement and their consequences, models of incident and ordered plane.)
5. Axiomatic construction of geometry: Hilbert's and Euclidean planes
(axioms of similarity and their consequences: triangles of similarity of triangles, properties of a triangle, construction of perpendiculars and parallels; axioms of parallelism and axioms of continuity)
Combinatorics, probability and statistics
1. Mathematical induction (principle of mathematical induction; connection with good arrangement of natural numbers; examples of use).
2. Pigeon/Dirichlet principle (formulation and some applications).
3. Combinatorial principles (addition principle, multiplication principle, bijection principle, counting in two ways).
4. Binomial coefficients and binomial theorem (definition and formula for binomial coefficients and some of their properties; binomial theorem formulation).
5. Principle of inclusion and exclusion (formulation and examples of use).
6. Probability, its basic properties. Conditional probability and independence of events. Complete Probability Theorem, Bayes Theorem.
7. Probability distributions, their properties and characteristics (distribution function, density, mean value, dispersion). Special types of distributions (alternative, binomial, geometric, exponential, normal). Central limit theorem.
8. Descriptive statistics (location and variability characteristics). Point estimates (random selection; estimates of mean and dispersion and their properties).
9. Confidence intervals for the mean value. Hypothesis testing, one-choice tests on the mean value.
Algebra and theoretical arithmetic
1. Linear representations and their matrices, product of matrices, inverse matrices.
2. Vector spaces and subspaces, linear combinations of vectors, linear representations.
3. Finite-dimensional vector spaces, base and dimension of finite-dimensional vector space.
4. Systems of linear equations, the existence of a solution of an inhomogeneous system of linear equations, the structure of the set of solutions of a homogeneous system of linear equations.
5. Divisibility in the field of integers. Theorem on division with the rest. The largest common divisor and the smallest common multiple of two integers. Euclidean algorithm for calculating the greatest common divisor.
6. Prime numbers, their properties, theorem about the decomposition of a natural number into the product of prime numbers. Number systems.
7. Congruences, divisibility criteria of natural numbers expressed in the decimal system, Euler's theorem, small Fermat's theorem.
Mathematical analysis
1. Limits of sequence and function, basic theorems about limits.
2. Continuity, properties of continuous functions on intervals, optimization - search for global extrema of continuous functions on closed intervals, relationship between continuity and differentiability of a function.
3. Derivation of a function, Lagrange's theorem on mean value and its use in investigating the monotonicity of functions, necessary and sufficient conditions for the existence of local extrema of differentiable functions.
4. Approximation of differentiable function by polynomials, equation of tangent, equation of Taylor polynomial of n-th degree.
5. Indefinite integral and primitive function, basic integration formulas, per partes method and substitutions.

6. Riemann integral, definition and calculation, heuristic derivation of formulas for calculation of area content, length of curve, volume of rotating body and surface of rotating body.
Languages necessary to complete the course: slovak, enghlish
Last change: 13.04.2023
Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KDMFI/1-UMA-142/22	Geometry (0)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Final evaluation: The student prepares a portfolio of at least three activities in geometry in the GeoGebra program. At the final evaluation, one must be selected at random. In addition, it responds from a randomly selected topic. It consists of theory and example.
Indicative assessment scale: A 94%, B 86%, C 79%, D 70%, E 60%, Fx <60%
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
Get an overview of the geometry of primary and secondary schools. Concepts, facts, procedures.

Class syllabus:
1. GeoGebra
2. Construction tasks - what at the elementary school, high school is a construction task, respectively. its solution
3. Pythagorean and Euclidean theorems
4. Rectangles
5. Circle, central, circumferential and section angle
6. Views, stacking of axial symmetries, vectors and displacement (introduction to the term vector)
7. Analytic geometry (vector) 2D
8. Analytical geometry 3D
9. 3D geometry - floor plan, front view, side view, constructions from cubes
10. Cuts and other bodies

Recommended literature:
elementary and high school mathematics textbooks
Seminár z matematiky : 3. časť / Zbyněk Kubáček, Ján Žabka Bratislava : Mapa Slovakia Plus s.r.o., 2020

Languages necessary to complete the course:
slovak

Notes:

The course is primarily intended for teacher training students; students of other programs can enroll in it only with the consent of their guarantor.

Past grade distribution
Total number of evaluated students: 62

A	B	C	D	E	FX
40,32	12,9	12,9	14,52	14,52	4,84

Lecturers: RNDr. Monika Dillingerová, PhD.

Last change: 17.03.2022

Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KAG/1-UMA-107/15	Geometry (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 3.

Educational level: I., N

Prerequisites: FMFI.KAG/1-UMA-112/22 - Algebra and Theoretical Arithmetic (1)

Course requirements:
Preliminary assessment: homework (10%), written tests (20%)
Final assessment: oral exam (70%)
During the semester, students must obtain at least 4/10 from the preliminary assessment in order to be eligible for the oral exam. Failure to meet this requirement automatically results in an FX grade.

Learning outcomes:
Master the analytical methods of studying the geometric properties of subspaces of n-dimensional affine (or Euclidean) space and its maps

Class syllabus:
- n-dimensional affine space A^n and Euclidean space E^n;
- coordinate systems;
- affine maps;
- orientation of affine space;
- subspaces / linear varieties in E^n: parametric description and implicit equations, relative positions, distances and angles of some subspaces;
- invariants of affine maps (fixed points, eigenvectors);
- isometries, reflections as generators of the group of isometries of the Euclidean plane

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 269

A	B	C	D	E	FX
19,7	14,13	20,82	16,36	16,36	12,64

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD., RNDr. Jana Chalmovianská, PhD.

Last change: 02.10.2025
Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KAG/1-UMA-220/15	Geometry (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 4.

Educational level: I., N

Prerequisites:

Course requirements:
Preliminary assessment: homework (20%), written tests (40%)
Final assessment: oral exam (40%)
Grading: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
The student gets familiar with the axiomatic construction of planimetry. He learns partly Euclid's, but especially Hilbert's axiomatic system. They will practice thorough mathematical argumentation and get knowledge of several models of different groups of axioms.

Class syllabus:
- history of axiomatics of geometry, Euclidean constructions
- axioms of incidence, incidence geometry models
- axioms of order, ordered plane models
- axioms of congruence, theorems about the congruence of triangles, arithmetics of line segments and angles, Hilbert plane
- controversy of the axiom of parallelism
- axioms of continuity and circle continuity principles
- some of Apollonius' problems

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 257

A	B	C	D	E	FX
17,51	15,95	26,07	17,9	11,67	10,89

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD., RNDr. Jana Chalmovianská, PhD.

Last change: 21.06.2022
Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KAG/1-UMA-301/22	Geometry (3)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 5.

Educational level: I., N

Prerequisites:

Course requirements:
Preliminary assessment: homework
Final assessment: written exam
Grading: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
The main goal of the course is to strengthen the spatial imagination. The students learn the basics of polyhedral theory, the possibilities of displaying three-dimensional objects in a plane and also maps of two-dimensional spaces, which require embedding into three dimensions. They get practice in solving stereometric problems.

Class syllabus:
- introduction to theory of polyhedral, Euler's theorem, Platonic solids
- incidence (sections of solids) and metric (distances and angles) problems in stereometry
- principles of parallel projection, orthogonal projection (Monge projection), oblique projection
- ellipse as an affine image of a circle
- central projection, linear perspective, basics of projective space
- non-linear projection: stereographic projection, other cartographic representations

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 242

A	B	C	D	E	FX
31,4	19,83	18,18	14,46	8,26	7,85

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD., RNDr. Barbora Pokorná, PhD.

Last change: 21.06.2022

Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KDMFI/1-UMA-310/23	Introduction to didactics of mathematics

Educational activities:
Type of activities: seminar
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 6.

Educational level: I.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 2

A	B	C	D	E	FX
100,0	0,0	0,0	0,0	0,0	0,0

Lecturers: doc. PaedDr. Mária Slavíčková, PhD.

Last change: 31.05.2023

Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KDMFI/1-UMA-143/22	Mathematical Analysis (0)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: seminar activity, two continuous tests
Final evaluation: test
Indicative assessment scale: A 94%, B 86%, C 79%, D 70%, E 60%, Fx <60%
Scale of assessment (preliminary/final): 60/40

Learning outcomes:
Students will deepen their knowledge of selected elementary functions, which they will use in introducing new concepts related to the functions of one real variable, sequences of real numbers and their properties. They will be able to properly apply digital technologies, solve tasks leading to modeling of selected phenomena from real life (e.g., cell proliferation, radioactive decay, physical laws, etc.)

Class syllabus:
Exponential functions, properties of powers (also rational), Logarithmic functions, Goniometric functions, Cyclometric functions, Sequences of numbers, intuitive notion of convergency of a number sequence.

Recommended literature:
Seminár z matematiky. Matematika pre maturantov. Zbierka úloh s riešeniami. 1. časť. / Z. Kubáček a J. Žabka. MAPA Slovakia, 2017
Seminár z matematiky. Matematika pre maturantov. Zbierka úloh s riešeniami. 2. časť/ Z. Kubáček a J. Žabka. MAPA Slovakia, 2018
Základy matematické analýzy: 1. díl / J. Veselý. Praha: Matfyz Press, 2004
Matematická analýza pro učitele: 1. díl / J. Veselý. Praha : Matfyz Press, 1997
A First Course in Real Analysis. 2nd Ed / M.H. Protter a C. B. Morrey. Springer-Verlag, 1991

Languages necessary to complete the course:
slovak, enghlis

Notes:

The course is primarily intended for teacher training students; students of other programs can enroll in it only with the consent of their guarantor.

Past grade distribution
Total number of evaluated students: 69

A	B	C	D	E	FX
23,19	17,39	23,19	21,74	11,59	2,9

Lecturers: RNDr. Monika Dillingerová, PhD.

Last change: 14.03.2022

Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KDMFI/1-UMA-101/22	Mathematical Analysis (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 3.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: two continuous tests, at least 60% for the progress of the written part of the exam
Examination: written and oral, at least 50% success in the written test for the oral part
Assessment scale: A 94%, B 86%, C 79%, D 70%, E 60%, Fx <60%
Scale of assessment (preliminary/final): 60/40

Learning outcomes:
Comprehention of basic ideas and concepts of differential calculus of functions of one real variable. After completing the course, the student can use the methods of differential calculus of functions of one variable in solving some specific, practical problems and simpler optimization problems, to create numerical estimates of quantities. Students will master more accurate methods of determining the course of the quantity, they will be able to approximate the values of functions with the values of the polynomial.

Class syllabus:
Estimates of lengths, areas and volumes, considerations using infinitesimal quantities (Kepler, Cavalieri). Introduction of real numbers. Limit of sequence, Convergence of a bounded monotonic sequence, Limits theorems. Function limits - a definition based on the concept of sequence limits. Function limit theorems. Continuity of a function , Basic properties of continuous functions at intervals. Derivation of functions, derivatives of higher orders, their applications. Mean value theorems, L´Hospital's rule.

Recommended literature:
Zbierka úloh z vyššej matematiky : 1. časť / Jozef Eliaš, Ján Horváth, Juraj Kajan. Bratislava : Alfa, 1985
Zbierka úloh z vyššej matematiky : 2. časť / Jozef Eliaš, Ján Horváth, Juraj Kajan. Bratislava : Alfa, 1986
Základy matematické analýzy : 1. díl / Jiří Veselý. Praha : Matfyzpress, 2004
Matematická analýza pro učitele : 1. díl / Jiří Veselý. Praha : Metafyz Press, 1997
A First Course in Real Analysis. 2nd Ed / M.H. Protter a C. B. Morrey. Springer-Verlag, 1991

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 282

A	B	C	D	E	FX
10,99	9,93	12,41	18,09	20,21	28,37

Lecturers: doc. PaedDr. Mária Slavíčková, PhD., Mgr. Michaela Vargová, PhD., Mgr. Katarína Kalužná

Last change: 17.06.2022

Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KDMFI/1-UMA-105/22	Mathematical Analysis (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 4.

Educational level: I.

Prerequisites: FMFI.KDMFI/1-UMA-101/22 - Mathematical Analysis (1)

Recommended prerequisites:
-

Course requirements:
Continuous assessment: two continuous tests, at least 60% for the progress of the written part of the exam
Examination: written and oral, at least 50% success in the written test for the oral part
Assessment scale: A 94%, B 86%, C 79%, D 70%, E 60%, Fx <60%
Scale of assessment (preliminary/final): 60/40

Learning outcomes:
Understand the basic concepts and principles of the curriculum specified in the syllabus. Using the techniques of integral calculus of one variable, they will be able to apply a definite integral in the calculation of measures of geometric shapes and bodies. They will understand the principle of deriving formulas to calculate these quantities. Using the above knowledge, students will be able to find solutions to selected problems, estimate the values of some functions and important constants using infinite series.

Class syllabus:
Taylor polynomial, Antiderivatives and Definite integral, Substitution rule, Integration by parts, The elements of Riemann integral theory, The Fundamental Theorem of Calculus, Application of Integration - areas between curves, volumes, arc length, area of surface of revolution, Improper integrals, Infinite series, Absolute convergence, Rearrangements of infinite series

Recommended literature:
Zbierka úloh z vyššej matematiky : 2. časť / Jozef Eliaš, Ján Horváth, Juraj Kajan. Bratislava : Alfa, 1985
Zbierka úloh z vyššej matematiky : 4. časť / Jozef Eliaš, Ján Horváth, Juraj Kajan. Bratislava : Alfa, 1986
Základy matematické analýzy : 1. díl / Jiří Veselý. Praha : Matfyzpress, 2004
Matematická analýza pro učitele : 1. díl / Jiří Veselý. Praha : Metafyz Press, 1997

A First Course in Real Analysis. Second Ed / Protter, M.H., a Morrey, C. B..Springer-Verlag, 1991

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 189

A	B	C	D	E	FX
16,4	14,29	16,4	27,51	18,52	6,88

Lecturers: doc. PaedDr. Mária Slavíčková, PhD., Mgr. Michaela Vargová, PhD., Mgr. Katarína Kalužná

Last change: 16.03.2022

Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KDMFI/1-UMA-211/22	Mathematical Analysis (3)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 6.

Educational level: I.

Prerequisites: FMFI.KDMFI/1-UMA-105/22 - Mathematical Analysis (2) or FMFI.KDMFI/1-UMA-101/22 - Mathematical Analysis (1)

Recommended prerequisites:
Matehematical analysis (1), Mathematical analysis (2)

Course requirements:
Continuous assessment: two continuous tests, at least 60% for the progress of the written part of the exam Examination: written and oral, at least 50% success in the written test for the oral part Assessment scale: A 94%, B 86%, C 79%, D 70%, E 60%, Fx <60%
Scale of assessment (preliminary/final): 60/40

Learning outcomes:
Students will be able to identify the type of integral and solve the integral by a suitable method. By modeling using differential equations, they will be able to describe simpler events in nature, such as different types of growth, descent, decay, mixing of fluids, gases. Using the above knowledge, students will be able to find solutions to selected problems, estimate the values of some functions and important constants using infinite series.

Class syllabus:
Techniques of Integration (Integration of Rational Function by Partial Fractions, Trigonometric Integrals, Trigonometric Substitution), Differential Equations (Separable Differential Equations, Linear Differential Equations), Applications of Diferential Equations, Functional Sequences, Uniform Convergence of Functional Sequences, Functional Series, Uniform Convergence of Functional Series, Term by Term Differentiation and Term by Term Integration of Series, Power Series, Taylor Series

Recommended literature:
A First Course in Real Analysis. Second Ed / Protter, M.H., a Morrey, C. B. Springer-Verlag, 1991

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 119

A	B	C	D	E	FX
45,38	21,01	15,97	5,88	8,4	3,36

Lecturers: doc. PaedDr. Mária Slavíčková, PhD., Mgr. Michaela Vargová, PhD., Mgr. Jana Havlíčková, PhD.

Last change: 16.03.2022

Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KDMFI/1-UMA-221/22	Mathematical Contests and Seminars (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: Homework - individual work of students
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will deepen and expand their knowledge of selected areas of lower secondary school mathematics with an emphasis on counting tasks from mathematical Olympiads, competitions and correspondence seminars. Focus on the issue of linking higher mathematics with lower secondary school mathematics, especially for gifted pupils or pupils with an increased interest in mathematics.

Class syllabus:
Number theory. Equations, inequalities and their systems. Sequence. Planimetry. Stereometry. Combinatorics. Logic.

Recommended literature:
Vybrané úlohy z matematických olympiád : Kategoria Z : výber riešených úloh z III. až XXI. ročníka súťaže / processed by J. Vyšín, V. Macháček. Bratislava : Slovenské pedagogické nakladateľstvo., 1974
Geometrické úlohy z matematickej olympiády ZŠ / M. Dillingerová. Bratislava : Metodicko-pedagogické centrum, 2005
Jak jse jmenuje tahle knížka / R. Smullyan. Praha : Portál, 2015
Matematici, ja a ty / P. Bero. Bratislava : Mladé letá, 1989
Odborný program matematických krúžkov na II. stupni ZŠ / H. Bachratý, K. Bachratá, V. Burjan. Bratislava : PÚMB, 1986
Tasks from Mathematical Olympiad, competitions and Mathematical correspondence seminars

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 39					
A	B	C	D	E	FX
76,92	15,38	2,56	0,0	5,13	0,0
Lecturers: Mgr. Emília Miťková, PhD.					
Last change: 17.03.2022					
Approved by: prof. Mgr. Michal Chabada, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KDMFI/1-UMA-222/22	Mathematical Contests and Seminars (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: Homework - individual work of students
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will deepen and expand their knowledge of selected areas of lower and upper secondary mathematics with an emphasis on counting tasks from mathematical Olympiads, competitions and correspondence seminars. Focus on the issue of linking higher mathematics with lower and upper secondary mathematics, especially for gifted pupils or pupils with an increased interest in mathematics.

Class syllabus:
Logic, reasoning and proof. Trigonometry. Game theory. Optimization tasks. Functions, their properties, and graphs.

Recommended literature:
Vybrané úlohy z matematických olympiád : Kategoria Z : výber riešených úloh z III. až XXI. ročníka súťaže / processed by J. Vyšín, V. Macháček. Bratislava : Slovenské pedagogické nakladateľstvo., 1974
Geometrické úlohy z matematickej olympiády ZŠ / M. Dillingerová. Bratislava : Metodicko-pedagogické centrum, 2005
Jak jse jmenuje tahle knížka / R. Smullyan. Praha : Portál, 2015
Matematici, ja a ty / P. Bero. Bratislava : Mladé letá, 1989
Odborný program matematických krúžkov na II. stupni ZŠ / H. Bachratý, K. Bachratá, V. Burjan. Bratislava : PÚMB, 1986
Tasks from Mathematical Olympiad, competitions and Mathematical correspondence seminars

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 8

A	B	C	D	E	FX
50,0	37,5	0,0	12,5	0,0	0,0

Lecturers: Mgr. Emília Miťková, PhD.

Last change: 17.03.2022

Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KDMFI/1-UMA-144/22	Probability Measure and Mathematical Statistics (0)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: continuous paper
Final evaluation: creating a portfolio of tasks and their solutions
Indicative assessment scale: A 94%, B 86%, C 79%, D 70%, E 60%, Fx <60%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Gaining a comprehensive view of the basic concepts and principles of probability and statistics and the ability to apply knowledge in this area in solving problems.

Class syllabus:
1. Basic concepts of probability and related tasks (random events, probability, complementary probability, independent events, certain event, impossible event).
2. Geometric probability and related problems.
3. Combinatorial probability and related problems. Bernoulli's scheme.
4. Conditional probability.
5. Basic concepts of statistics: averages - arithmetic, weighted, geometric, harmonic, modus, median, standard deviation.

Recommended literature:
Matematika pre 4. ročník gymnázií a 8. ročník gymnázií s osemročným štúdiom. / Kubáček, Z. Bratislava : Orbis Pictus Istropolitana, 2013
Matematika pre 3. ročník gymnázií a 7. ročník gymnázií s osemročným štúdiom (1. časť). / Kubáček, Z. Bratislava : Orbis Pictus Istropolitana, 2010
Matematika a svet okolo nás. / Kubáček, Z., Černek, P., Žabka, J. Bratislava: PACI, 2008
Ako sa počíta pravdepodobnosť? / Bachratý, H., Grendár, M. a Bachratá, K. Žilina : Žilinská univerzita, 2010
Matematika náhody. / Anděl, J. Praha : Matfyzpress, 2000

Languages necessary to complete the course:
slovak, enghlish

Notes:
The course is primarily intended for teacher training students; students of other programs can enroll in it only with the consent of their guarantor.

Past grade distribution
Total number of evaluated students: 74

A	B	C	D	E	FX
41,89	36,49	9,46	5,41	2,7	4,05

Lecturers: doc. PaedDr. Peter Vankúš, PhD.

Last change: 14.03.2022

Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KAMŠ/1-UMA-302/22	Probability Measure and Mathematical Statistics (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 5.

Educational level: I.

Prerequisites:

Course requirements:
Preliminary evaluation: papers during the semester (40%)
Final exam: project (30%) and oral exam (30%)
Rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
After completing the course, students will acquire classical probabilistic methods, axiomatic probability approach, will be able to work with discrete and continuous random variables and apply them to solve various problems. They will learn some statistical procedures and will be able to make point and interval estimators.

Class syllabus:
Basic concepts of probability, classical, geometric and axiomatic definition of probability. Conditional probability, Bayes' theorem, independence of random events, Bernoulli's scheme. Continuous and discrete random variables. Distribution function and its properties, numerical characteristics. Normal distribution and central limit theorem.
Descriptive statistics. Random sample, sample characteristics, random sample from normal distribution. Point estimation, maximum likelihood method. Interval estimates for mean and variance. Hypothesis testing.

Recommended literature:
Pravdepodobnosť a štatistika / K. Janková, A. Pázman. Bratislava : Univerzita Komenského, 2011
Zbierka úloh zo základov teórie pravdepodobnosti / R. Harman, E. Hönschová, J. Somorčík. Bratislava : PACI, 2009
Štatistika zrozumiteľne / J. Somorčík, I. Teplička. Nitra : Enigma, 2015
Introduction to probability models / S. M. Ross. Academic Press, 2010

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 220

A	B	C	D	E	FX
27,27	21,82	16,82	13,18	13,18	7,73

Lecturers: Mgr. Lívia Rosová, PhD., doc. Mgr. Lenka Filová, PhD.

Last change: 21.06.2022

Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KAMŠ/1-UMA-309/22	Probability Measure and Mathematical Statistics (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 6.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-UMA-302/22 - Probability Measure and Mathematical Statistics (1)

Course requirements:
Preliminary evaluation: papers during the semester (40%)
Final exam: project (30%) and oral exam (30%)
Rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
Students will be able to work with multidimensional distributions of discrete and continuous type. They will be able to apply the obtained probability theory to selected statistical problems of parameter estimation and hypothesis testing. They will be able to solve simple correlation and regression analysis problems.

Class syllabus:
Random vectors and their characteristics. Marginal and conditional distributions and densities. Multidimensional normal distribution and its properties. Statistical inference, parameter estimation, maximum likelihood and moment method, correlation coefficient. Statistical hypothesis testing, one-sample and two-sample tests. Regression models and least squares method. Goodness of fit tests.

Recommended literature:
Pravdepodobnosť a štatistika / K. Janková, A. Pázman. Bratislava : Univerzita Komenského, 2011
Zbierka úloh zo základov teórie pravdepodobnosti / R. Harman, E. Hönschová, J. Somorčík. Bratislava : PACI, 2009
Štatistika zrozumiteľne / J. Somorčík, I. Tepličká. Nitra : Enigma, 2015
Introduction to probability models / S. M. Ross. Academic Press, 2010

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 133					
A	B	C	D	E	FX
35,34	29,32	12,03	10,53	9,77	3,01
Lecturers: doc. Mgr. Lenka Filová, PhD., Mgr. Lívia Rosová, PhD.					
Last change: 21.06.2022					
Approved by: prof. Mgr. Michal Chabada, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KMANM/1-UMA-131/22	Revision of Advanced Secondary-school Mathematics

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: I.

Prerequisites:

Antirequisites: FMFI.KAG/1-KXX-007/20 and FMFI.KAG/1-KXX-017/20 and PriF-FMFI.KAG/N-bCXX-002/20 and PriF-FMFI.KAG/C-bCXX-010/20

Course requirements:
Ongoing evaluation: 2 written exams
Indicative rating scale: A 91%, B 81%, C 71%, D 61%, E 51%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
After completing the course, students will master the apparatus of high school mathematics (basics of logic, basic concepts of set theory, the concept of function) at the level required to study some parts of university mathematics.

Class syllabus:
Logic and sets, basic types of proofs. Functions and their basic properties. Linear and quadratic function.

Recommended literature:
Matematika pre 1. ročník gymnázií : 1. časť / Zbyněk Kubáček. Bratislava : Slovenské pedagogické nakladateľstvo, 2009
Matematika pre 1. ročník gymnázií : 2. časť / Zbyněk Kubáček. Bratislava : Slovenské pedagogické nakladateľstvo, 2010
Matematika pre druhý ročník gymnázií : 1. časť / Zbyněk Kubáček. Bratislava : Orbis Pictus Istropolitana, 2009
Matematika pre 2. ročník gymnázií a 6. ročník gymnázií s osemročným štúdiom : 2. časť / Zbyněk Kubáček. Bratislava : Orbis Pictus Istropolitana, 2010
Nová maturita : Matematika : Interná časť - ústna skúška / Pavol Černek, Zbyněk Kubáček. Bratislava : Slovenské pedagogické nakladateľstvo, 2005
Matematika pre 3. ročník gymnázia a 7. ročník gymnázia s osemročným štúdiom : 1. časť / Zbyněk Kubáček. Bratislava : Slovenské pedagogické nakladateľstvo, 2012

Matematika pre 3. ročník gymnázia a 7. ročník gymnázia s osemročným štúdiom : 2. časť / Zbyněk Kubáček. Bratislava : Slovenské pedagogické nakladateľstvo, 2013
Matematika : 1 : zbierka úloh pre stredné školy / Iveta Kohanová ... [et al.]. Bratislava : Orbis Pictus Istropolitana, 2011
Seminár z matematiky : 1. časť / Zbyněk Kubáček, Ján Žabka. Bratislava - Mapa Slovakia, 2017

Languages necessary to complete the course:
Slovak, English

Notes:
The course is primarily intended for teacher training students; students of other programs can enroll in it only with the consent of their guarantor.

Past grade distribution
Total number of evaluated students: 339

A	B	C	D	E	FX
20,94	18,58	15,63	19,47	18,29	7,08

Lecturers: doc. RNDr. Zbyněk Kubáček, CSc., doc. PaedDr. Peter Vankúš, PhD.

Last change: 24.06.2022

Approved by: prof. Mgr. Michal Chabada, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Arts

Course ID:	**Course title:**
FMFI.KDMFI/1-UMA-311/23	Students' Research Exhibition

Educational activities:
Type of activities: training session
Number of hours:
per week: **per level/semester:** 3d
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 6.

Educational level: I.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 0

A	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0

Lecturers: doc. PaedDr. Mária Slavíčková, PhD.

Last change: 15.01.2024

Approved by: prof. Mgr. Michal Chabada, PhD.